CLAIMS

1. A process for forming an optical device in a glass substrate, comprising the steps of:

providing a glass substrate having a base index of refraction; providing a UV light beam;

focusing said beam on a portion of said glass substrate in order to form a region of increased refraction; and

scanning an elongated region of said glass substrate with said beam in order to define at least one first elongated optical channel having an increased index of refraction relative to said base index of refraction, said first elongated optical channel for guiding light transmitted there along.

2. The method of claim 1, further comprising the step of: encasing at least a portion of said first elongated optical channel in a protective material.

3. The method of claim 2, wherein said protective material is glass.

4. The method of claim 3, wherein said protective material is doped glass.

5. The method of claim 1, wherein said glass substrate is doped with dopants chosen form the group consisting essentially of Germanium, tin and Boron.

6. The method of claim 1, further comprising the step of forming a plurality of second elongated optical channels in said glass substrate, wherein said first elongated optical channel guides light toward said plurality of elongated optical channels such that said guided light is divided among said plurality of second elongated optical channels, thereby forming an optical beamsplitter.

7. The beamsplitter of claim 6, wherein said light is divided equally among said plurality of second elongated optical channels.

8. The method of claim 6, including the step of:

forming at least one thermo-optic switch across at least one of said second elongated optical channels so as to form an optical switching device for switching light transmitted through said first optical channel to a selected one of said second optical channels.

9. The method of claim 1, wherein said first optical channel is operative to receive a multi-wavelength light beam, including the steps of:

providing a beam splitter for splitting said multi-wavelength light beam into a plurality of multi-wavelength light beams;

forming a plurality of second elongated optical channels for guiding said plurality of multi-wavelength light beams, wherein each said second elongated optical channel guides a selected one of said plurality of multi-wavelength light beams, wherein each said second elongated optical channel has a different length such that light transmitted there upon exits each said second optical channel with a different phase shift; and

providing a lens region for refocusing said plurality of phase shifted multi-wavelength light beams into a plurality of narrow wavelength light beams of differing wavelengths, thereby forming an optical wavelength demultiplexer.

10. The method of claim 4, including forming additional elongated optical channels in said protective glass material in order to form a multi-layered integrated optical device.

11. A device for manufacturing optical components on a glass substrate, comprising:

a laser projecting mechanism for providing a laser beam;

focusing optics for focusing said laser beam onto the glass substrate such that the refraction index of at least a portion of the glass substrate is substantially increased; and

a stage for moving the glass substrate relative to said laser beam so that said laser beam scans a path creating at least one channel of increased refraction formed in the glass substrate, wherein said channel is operative for carrying at least one light beam.

12. The device of claim 11 further including an autofocusing unit operative to control said focusing optics.

13. An integrated optical device formed in accordance with a process, comprising the steps 2 of:

providing a glass substrate having a base index of refraction;

providing a UV light beam;

focusing said beam on a portion of said glass substrate in order to form a region of 6 increased refraction; and

scanning an elongated region of said glass substrate with said beam in order to define a first elongated optical channel having an increased index of refraction relative to said base index of refraction, said first optical cannel for guiding light transmitted there along.

14. The integrated optical device as recited in claim 13, formed in accordance with a process, including the step of:

forming a plurality of second elongated optical channels in said glass substrate, wherein said first optical channel is operative for transmitting light to said plurality of second elongated optical channels such that said transmitted light is divided among said plurality of second elongated optical channels, thereby forming an optical beamsplitter.

15. The integrated optical device as recited in claim 14, formed in accordance with a process, including the step of:

forming at least one thermo-optic switch across at least one of said second elongated optical channels so as to form an optical switching device for switching light transmitted through said first optical channel to a selected one of said second optical channels.

16. The integrated optical device of claim 13, wherein said first optical channel receives a multi-wavelength light beam, formed in accordance with a process, including the steps of:

providing a beam splitter for splitting said multi-wavelength light beam into a plurality of multi-wavelength light beams;

forming a plurality of second elongated optical channels for guiding said plurality of multi-wavelength light beams, wherein each said second elongated optical channel guides a selected one of said plurality of multi-wavelength light beams, wherein each said second elongated optical channel has a different length such that light transmitted there upon exits

each said second optical channel with a different phase shift; and

providing a lens region for refocusing said plurality of phase shifted multi-wavelength light beams into a plurality of narrow wavelength light beams of differing wavelengths, thereby forming an optical wavelength demultiplexer.

17. The integrated optical device of claim 13, wherein said glass substrate is doped with dopants chosen form the group consisting essentially of Germanium, tin and Boron.

18. The integrated optical device of claim 13, formed in accordance with a process, including the step of:

encasing at least a portion of said elongated optical channel in a protective material.

19. The integrated optical device of claim 13, wherein said protective material is glass.

20. The integrated optical device of claim 13, wherein said protective material is doped glass.